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Status of the Little River stock of Atlantic salmon(Salmo salar L.) in 1993

by

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[1]This series documents the scientific basis for the evaluation of fisheries resources in Atlantic Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

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[1]La présente série documente les bases scientifiques des évaluations des ressources halieutiques sur la côte atlantique du Canada. Elle traite des problèmes courants selon les échéanciers dictés. Les documents qu'elle contient ne doivent pas être considérés comme des énoncés définitifs sur les sujets traités, mais plutôt comme des rapports d'étape sur les études en cours.

Les Documents de recherche sont publiés dans la langue officielle utilisée dans le manuscrit envoyé au secrétariat.

Abstract

An assessment of the Little River stock was conducted for the first time. The target egg deposition for the watershed is 1,289,992 eggs. This requirement was detailed for the accessible and inaccessible portions (313,920 and 976,072 eggs, respectively) of the watershed. This assessment documented enhancement (stocking) activities, as well as natural spawning. Stocking of unfed fry commenced on the watershed in 1990 and presently continues. Based on the stocking program and natural spawning, the Little River has been achieving, on average, 99% of its required egg deposition, in the accessible portion of the watershed, since 1987.

Résumé

Pour la première fois, on a procédé à une évaluation du stock de la rivière Little. La ponte-cible pour le bassin hydrographique de la rivière est de 1 289 992 oeufs, soit respectivement 313 920 et 976 072 oeufs) pour les parties accessibles et les parties inaccessibles de ce bassin. Cette évaluation a fourni des renseignements sur les activités de mise en valeur (empoissonnement) et sur le frai naturel. L'empoissonnement d'alevins non alimentés a débuté dans le bassin en 1990 et se poursuit actuellement. En se fondant sur le programme d'empoissonnement et sur le frai naturel, on a établi qu'une proportion de 99 % de la ponte-cible était atteinte en moyenne dans la partie accessible du bassin hydrographique depuis 1987.

Introduction

The Little River flows into the Bay d'Espoir in Salmon Fishing Area (SFA) 11, approximately 4 km south of the Conne River. The watershed encompasses 183 km^2 with a complete obstruction at kilometre 4.8 on the main stem of the river which results in anadromous Atlantic salmon having access to less than 30% of the watershed.

The Council of the Conne River Micmacs provides funding and operates an enhancement project on the Little River with the goal of ranching the area above the obstruction and utilizing the returns from this activity for broodstock and recreational angling opportunities. The Band Council accepts that the Little River project is more a training ground for larger scale projects envisioned in the future. The Department of Fisheries and Oceans (DFO) provides biological and technical advice with respect to enhancement operations, with all data being collected by Band Council staff.

This paper will discuss the total egg deposition for the watershed in terms of eggs and spawners, however, the target for the system will be the egg requirement for the accessible portion of the watershed.

Background

The Little River enhancement project commenced a feasibility study in 1987 with a counting fence operation to enumerate adult salmon. Adults have been enumerated each year since. Smolt counts were conducted in 1991-1993. The 1991 smolt data are not used due to confusion between smolt and smelt in 1991.

Egg incubations were conducted from 1989-1993 with varying degrees of success. Initially, deep substrate incubators were utilized with limited success and in 1992, a trough system was introduced which proved to be quite successful.

Prior to the commercial moratorium in 1992, the Little River contributed to the commercial salmon fishery along the coast of Newfoundland and possibly the Greenland fishery.

The recreational fishery was open on this river up to 1988, however, angling stats are only available for 1975. It is interesting to note that the counts at the fence increased in 1989 with the closure of the sports fishery, which is still in effect.

It should be noted that due to environmental conditions, smolt are captured as early as the fence is installed, suggesting that the counts are incomplete.

Additionally, large downstream movements of parr are noted during the smolt run, suggesting downstream (possibly estuarine) rearing may be occurring.

Methods

Biological characteristic data are those determined from the Little River stock in 1993 with the fecundity figure being that of the Conne River for 1993 (supplied by B. Dempson) and are as follows;

Sex Ratio - 79% female
Mean weight of females - 1520 gm
Mean length of females - 52 cm
Fecundity - 1727 eggs per female

Habitat determinations were calculated based on a stream survey conducted in 1986 by project staff.

Target egg requirement was calculated based on 240 eggs/100m^2 and 7 smolts/ha of standing water (O'Connell et al., 1991).

In order to calculate the egg deposition in areas where fry stocking occurred, an egg-to-fry survival of 20% (Sturge, 1968) was used. The number of fry released, was back calculated to estimate the required number of eggs to produce those fry. Sturge (1968) in his work, gave a range of 10-30% for egg-to-fry survival and indicated that a figure of 20% appeared to be a reasonable value.

Results and Discussion

Tables 1, 2 and 3 detail the available habitat, target egg deposition and number of spawners required for the Little River watershed. The data is presented for the area above and below the obstruction as fish passage is impossible and stocking occurs above the falls. To date, no major returns from stockings above the falls have occurred. Table 4 details the egg deposition rates for the watershed; the only possible enhanced returns to date are 2^+ smolts from the 1990 fry stocking.

Analysis of the river ages of returning adults revealed the run is composed of 8.7%, 81.7% and 9.6% of 2^+, 3^+ and 4^+ river ages, respectively. The 1993 smolt run was comprised of fish that were 32.7%, 58.1% and 9.3% river ages 2^+, 3^+ and 4^+, respectively.

Table 5 details the dates of counting fence operation and the number of smolt and parr enumerated for 1992 - 1993. As noted previously, smolt were always

enumerated upon trap placement. Of interest is the large number of parr enumerated at the fence each year. The fence site is located approximately 1 km upstream of the river mouth but is under tidal influence. This is suggestive that these parr are smoltifying downstream of the fence site.

Biological characteristics of a sample of parr collected below the fence in August, 1993 is detailed in Table 6. The presence of 0' parr below the fence may be indicative of spawning below the fence and if this is the case egg deposition is underestimated. The sex ratio of this sample was 1.3 :1.0 in favour of females (1 male parr had matured precociously).

Smolt to adult survival figures are not calculated as they are not likely indicative of the entire smolt output.

References

O'Connell, M. F., J. B. Dempson, and R. J. Gibson. 1991. Atlantic salmon (*Salmo salar* L.) smolt production parameter values for fluvial and lacustrine habitats in insular Newfoundland. CAFSAC Res. Doc. 91/19. 11p.

Sturge, C. C. 1968. Production studies of the young stages of Atlantic salmon (*Salmo salar* L.) in an experimental area of Indian River, Notre Dame Bay, Newfoundland. M.Sc. Thesis, Dept. Biology, Memorial University of Newfoundland. 134p.

Table 1. Rearing area available within the Little River watershed.

	Riverine Habitat ($100m^2$)	Lacustrine Habitat (Ha.)
Accessible	**1,308**	0
Inaccessible	3,913	989
Total	5,221	989

Table 2. Target egg deposition for the Little River watershed.

	Riverine Habitat ($100m^2$)	Lacustrine Habitat (Ha)
Accessible	**313,920**	**0**
Inaccessible	939,120	36,952
Total	1,253,040	36,952

Table 3. Number of spawners required for the Little River watershed.

	Riverine Habitat ($100m^2$)	Lacustrine Habitat (Ha)
Accessible	**230**	**0**
Inaccessible	688	27
Total	918	27

Table 4. Egg deposition rates for Little River 1987-1993.

Year	Fence Count	Spawning Escapement	Fry stocked Below Falls	Fry Stocked Above Falls	Egg Equiv. Below Falls	Egg Equiv. Above Falls	Natural Egg Deposition	% Target Wild	Total Eggs	% Target Below Falls	% Target Above Falls
1987	67	67	0	0	0	0	91,410	29.12%	91,410	29.12%	0.00%
1988	68	68	0	0	0	0	92,774	29.55%	92,774	29.55%	0.00%
1989	107	66	0	0	100,350	0	90,046	28.68%	190,396	60.65%	0.00%
1990	173	91	20,070	0	204,835	0	124,154	39.55%	328,989	104.80%	0.00%
1991	61	31	40,967	0	103,715	0	42,294	13.47%	146,009	46.51%	0.00%
1992	125	28	20,743	0	102,835	553,380	38,201	12.17%	694,416	44.93%	56.69%
1993	180	80	20,567	110,676	*	*	109,146	34.77%	109,146	34.77%	*

* data not available to date

Table 5. Details of smolt and parr enumeration Little River.

Year	Dates of Operation	Number of Smolt	Number of Parr
1992	May 11 - July 5	382	1404
1993	May 15 - July 5	324	1500

Table 6 . Biological characteristics of parr sample (N = 46) collected below counting fence 1993.

Age	% of Sample	Mean weight (N)	Mean length (N)
0+	8.7	1.95 (4)	6.0 (4)
1+	37.0	6.74 (17)	8.68 (17)
2+	47.8	15.88 (22)	11.07 (22)
3+	6.5	18.8 (3)	12.07 (3)

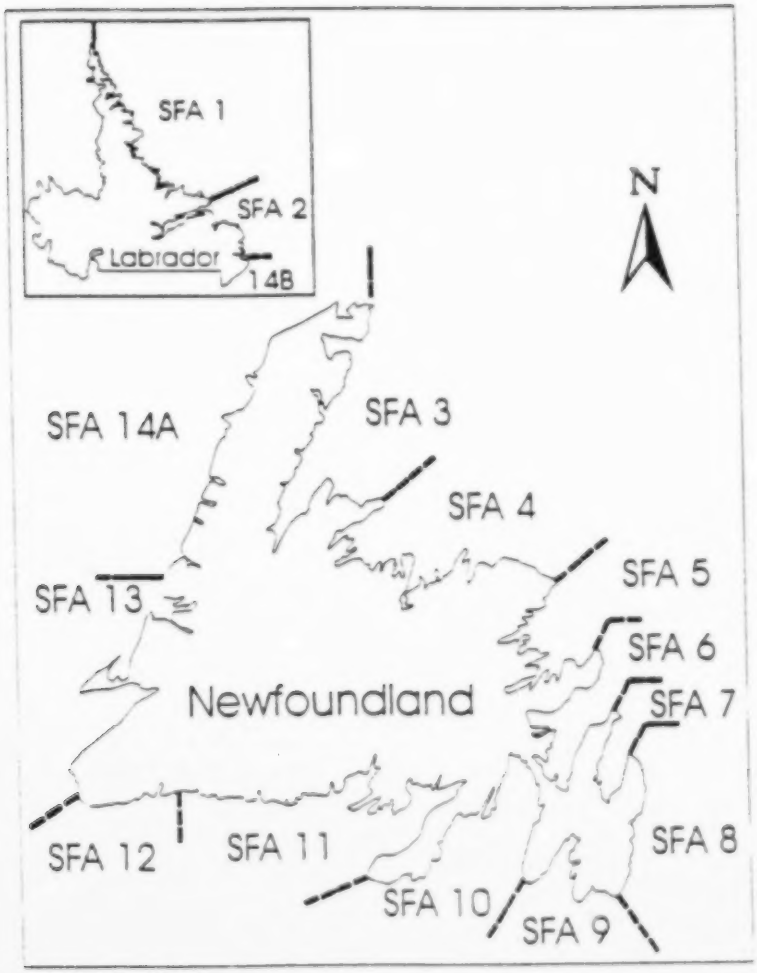

Fig. 1. Map showing the 14 Salmon Fishing Areas of the Newfoundland Region.